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IN RE APPLN. OF: SAUNDERS ET AL.  
APPLICATION No. 09/622,382  
FILED: JANUARY 12, 2001  
FOR: ADAPTING MULTIFILAR ANTENNA  
GROUP ART UNIT 2821  
EXAMINER: JAMES VANNUCCI

CLAIMS:

1. An adaptive multifilar antenna comprising:
  - a number of spaced filaments, where said number is an integer greater than 1;
  - a matching circuit for matching the characteristic impedance of the antenna to that of a transmitting and/or receiving apparatus;
  - a weighting circuit operable to apply respective phase adjustments to signals passed to and/or from the spaced filaments;
  - detecting means operable to detect at least one electrical property of the multifilar antenna with respect to the frequency, polarisation and/or direction of propagation of a signal to be received or transmitted by the multifilar antenna and/or impedance matching of the antenna; and
  - control means, responsive to the detecting means, operable to control the operation of the weighting circuit to adjust the properties of the multifilar antenna to suit better a current signal to be received or transmitted.
2. An antenna according to claim 1, wherein the weighting circuit is operable to apply gain adjustments to signals passed to and/or from the spaced filaments.
3. An antenna according to claim 1, wherein the control means is operable to control the operation of the matching circuit to adjust the properties of the multifilar antenna to suit better a current signal to be received or transmitted.
4. An according to claim 1, including switching means associated with each filament for selectively altering the electrical length and/or interconnections of the filaments and the signal connections to/from the filaments being at a first end of each filament; and
  - the switch means being operable to selectively interconnect pairs of filaments at a second end of those filaments remote from the first end.

IN RE APPLN. OF: SAUNDERS ET AL.  
APPLICATION NO. 09/622,382

5. An antenna according to claim 1, including switch means associated with each filament for selectively altering the electrical length and/or interconnections of the filaments and  
each filament including at least a first filament section and a second filament section; and  
the switch means being operable to selectively connect or isolate the first and second filament sections of each filament so as to vary the electrical length of that filament.
6. An antenna according to claim 1, in which:  
the detecting means is operable to detect a signal to noise ratio of a received signal; and  
the control means is operable to control the operation of the matching circuit and/or the weighting circuit so as to improve the signal to noise ratio of the received signal.
7. An antenna according to claim 1, in which:  
the detecting means is operable to detect a signal to noise plus interference ratio of a received signal; and  
the control means is operable to control the operation of the matching circuit and/or the weighting circuit so as to improve the signal to noise plus interference ratio of the received signal.
8. An antenna according to claim 1, in which:  
the detecting means is operable to detect a signal level of a received signal; and  
the control means is operable to control the operation of the matching circuit and/or the weighting circuit so as to improve the signal level of the received signal.
9. An antenna according to claim 1, in which:  
the detecting means is operable to detect a VSWR for a transmitted signal; and  
the control means is operable to control the operation of the matching circuit and/or the weighting circuit so as to improve the VSWR for transmission of that signal.
10. An antenna according to claim 1, in which the detecting means comprises:  
analogue to digital conversion means for converting respective signals received by the filaments into corresponding digital representations  
a memory for storing the digital representations;  
means for combining the digital representations using respective phase relationships and gains; and

IN RE APPLN. OF: SAUNDERS ET AL.  
APPLICATION NO. 09/622,382

means for detecting properties of the antenna by analysis of the combined digital representations.

11. An antenna according to claim 1, in which the detecting means comprises:  
means for combining respective signals received by the filaments using respective phase relationships

analogue to digital conversion means for converting the combined signals into a corresponding digital representation;

a memory for storing the digital representation; and

means for detecting properties of the antenna by analysis of the combined digital representations.

12. An antenna according to claim 11, wherein the combining means is operable to combine the respective signals using respective gain weightings.

13. An antenna according to claim 1, in which the detecting means operates at least during reception of a reference signal burst by the antenna.

14. An antenna according to claim 1, in which said number is an even integer.

15. An antenna according to claim 1, in which said number is equal to 4 or 6.

16. An antenna according to claim 1, in which the filaments are helically shaped.

17. An antenna according to claim 1, in which the filaments are at least partially intertwined.

18. An antenna according to claim 1, having a volute of generally elliptical or rectangular axial cross-section.

19. An antenna according to claim 1, wherein the weighting circuit operates at baseband.

20. An antenna according to claim 1, wherein the weighting circuit operates at RF.

21. An Antenna according to claim 20, wherein the respective outputs of the weighing circuit are combined prior to frequency downconversion.

22. An adaptive multifilar antenna comprising:  
a number of spaced antenna filaments, where said number is an integer greater than 1;  
a matching circuit for matching the characteristic impedance of the antenna to that of a

IN RE APPLN. OF: SAUNDERS ET AL.  
APPLICATION NO. 09/622,382

transmitting and/or receiving apparatus;

a phasing circuit for applying respective gain and phase adjustments to signals passed to or from the spaced filaments;

switch means associated with each filament for selectively altering the electrical length and/or interconnections of the filaments;

means for detecting electrical properties of the multifilar antenna with respect to the frequency, polarisation and/or direction of propagation of a signal to be received or transmitted by the multifilar antenna and/or impedance matching of the antenna; and

control means, responsive to the detecting means, for controlling the operation of the matching circuit, the phasing circuit and the switch means to adjust the properties of the multifilar antenna to suit better a current signal to be received or transmitted.